HOUSING MARKET INFORMATION

HOUSING MARKET INSIGHT
Ontario

CANADA MORTGAGE AND HOUSING CORPORATION

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"The current Ontario price correction fails to fully resemble historical price bust periods. Home prices are plateauing and are expected to grow along a more sustainable linear path supported by continued economic growth, moderate increases in interest rates and only modest increases in new housing supply."

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Ontario Regional Economist

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Are Ontario home prices in a corrective or price bust[1] phase?

Highlights

- The trajectory of Ontario home prices important for economic and financial stability
- Current Ontario price correction does not resemble more severe historical price bust periods
- Fundamental[3] and technical[4] indicators support prices growing in line with inflation over 2018/19 period
- Balanced markets mean stable home prices and less urgency to act among buyers
- Stable prices will result in more certainty for lenders while requiring owners and investors to adjust price and return expectations

Ontario Housing Prices and Transmission Channels

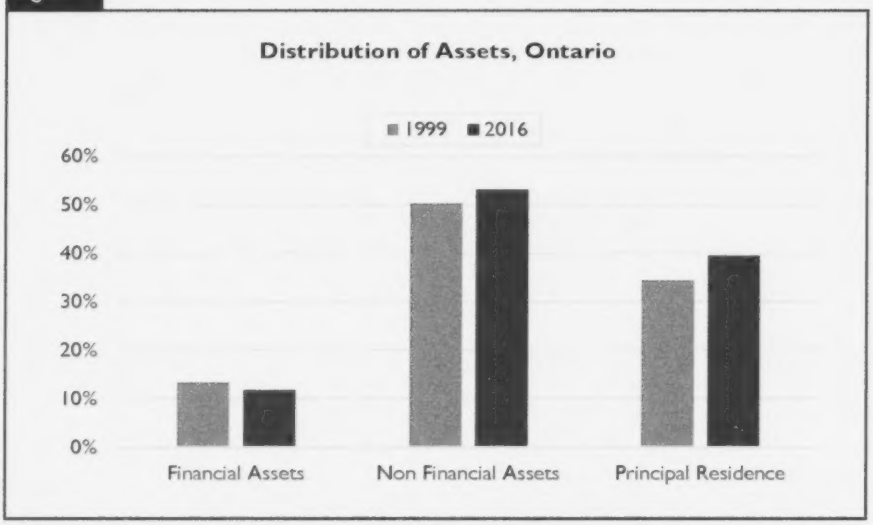
The recent great recession which began in the US in 2008 and spread to other countries is a stark reminder of how important the behaviour of home prices are to financial and economic stability. Home prices in some major centres grew at rates well above historical averages in recent years and exceeded what fundamentals such as population, income and interest rates would support as evidenced by the presence of overvaluation[5]. According to Figure 1, about 40%[6] of all Ontario household assets are tied up in a household's principal residence. Rising home prices and declining interest rates over the past decade enabled Ontario households to borrow against their home equity[7] as evidenced by rising home equity lines of credit (HELOC) balances in recent years. Consequently, a significant downturn in prices could have negative repercussions on the broader Ontario economy and financial system. What would the second round[8] effects and transmission channels be if prices would correct sharply and persist at lower levels? A sharp downturn in home

prices may spark a negative wealth effect[9] which could severely impair consumer confidence and general consumer spending. The aftermath of the sharp downturn in US home prices during the 2007-11 period, Japan's experience in the early 1990s[10] and the sensitivity of Hong Kong's economy[11] to home price shocks are international examples which underscore the wide reaching negative effects of a sharp decline in home prices. Indeed there is a strong causal relationship[12] between changes in home equity and changes in consumer spending in the province of Ontario over time. A sharp downturn in home prices may also restrain a lender's ability to expand credit which in turn could choke off additional economic growth in the future. For this reason, policy makers and industry stakeholders should have a keen interest in where Ontario home prices are headed and what, if any, conditions could trigger a bust period in home prices ahead.

Moderate Increases in Home Prices Expected

Fundamental and technical analysis are two approaches[13] utilized in this report to detect home price vulnerabilities ahead in Ontario. CMHC's conventional quantitative models which rely on demand and supply factors suggest that prices will continue to grow but at a more moderate pace and more in line with the rate of inflation. A more benign growth in home prices will result from the continued persistence of overvaluation in some major markets in Ontario. Ontario prices will range between $562,000 to $575,000 in 2018 and $570,000 and $595,000 in 2019. Both real and compositional factors are at play shaping the outlook for home prices. Real factors include: the stage of the economic cycle Ontario is in, the level of ownership affordability, the level of in-migration and the balance between supply and demand. Compositional factors relates to the mix of homes expected to sell in 2018 and 2019.

Figure 1



Source: Statistics Canada Survey of Financial Security, 2016

A Mature Economic Cycle Not Sufficient To Trigger a Price Bust

A real estate cycle like the economic cycle has four important phases. This includes: recovery, expansion, peak and contraction. The duration of an entire real estate cycle and its amplitude[14] can vary over time[15] as can the duration of individual phases. According to Figure 2, inflation adjusted home prices in Ontario were in a recovery phase for almost two decades alone following the early 1990s recession. Furthermore, the current expansion in inflation adjusted prices in Ontario was nine years in the making prior to the decline posted by the second quarter of 2017. This suggests that the duration of real estate cycles may be impacted less by repeating fluctuations tied to calendar years and influenced more by a shock to interest rates and the economy. Financial deregulation, less interest rate cyclicality owing to inflation targeting and new housing supply constraints over the past two decades may explain, among other factors, why the Ontario real estate price cycle was lengthening while its amplitude was generally shallower.

Ontario real estate prices are highly correlated to the health of the broader economy[16]. Does the economic cycle which is currently at the mature phase relative to previous cycles suggest a price bust period is imminent? The Ontario economic expansion is currently into its seventh year but while being at the mature segment of the expansion phase, Ontario economic expansions have exhibited longer durations in the past[17]. The current mix of stronger government spending and moderate interest rate increases suggests the Ontario and GTA economies are expected to grow more moderately but to continue to provide underlying

support for provincial real estate prices in 2018 and 2019. This would be in stark contrast to previous economic cycles in the 1970s and 1980s which were less supportive of real estate markets owing to shocks to energy prices, inflation, interest rates and by extension housing affordability. In addition, high levels of in-migration, resale markets that remain balanced and modest increases in new supply[18] relative to new households formed suggest the current correction in home prices should be short-lived and consistent with a shallower amplitude witnessed since the mid-1990s.

Besides real factors such as the economy, demographic trends and forces of supply and demand, the mix of homes expected to sell (i.e. compositional trends) will also shape future home prices. Eroding affordability, owing to rising interest rates and new mortgage rules, will shift consumer demand towards higher density housing as some first time buyers opt for less expensive homes in order to qualify for mortgage financing. Other potential first time buyers may opt to rent instead as an affordable alternative. Consequently, fewer single family home sales in the mix of all homes sold will restrain overall price appreciation. This will be particularly true in markets such as Toronto and Hamilton where single family homes are now more expensive for the average buyer. However, modest price growth is expected as recent price declines were amplified by a low volume of detached sales coinciding with a sharp pull back in luxury home sales. Indeed, the GTA two storey single family quality adjusted price[19] stabilized in early 2018 and posted increases in recent months.

Probability Model Explains 66% of Historical Price Bust Periods

The use of probability models[20] is another fundamental approach employed to help detect whether the current home price correction will persist. The estimated model[21] assesses what factors contributed to price bust periods over time in the Toronto market. Toronto is used as a case study since neighbouring southern Ontario markets have been shown to be highly correlated to Toronto prices[22]. As such, conditions triggering a price bust period in Toronto become potential triggers for other neighbouring Ontario markets.

Table 1 illustrates that Toronto inflation adjusted prices experienced five bust periods since the 1960s. On average, these bust periods

Figure 2

Source: TREB, Statistics Canada, CMHC seasonal and inflation adjustment

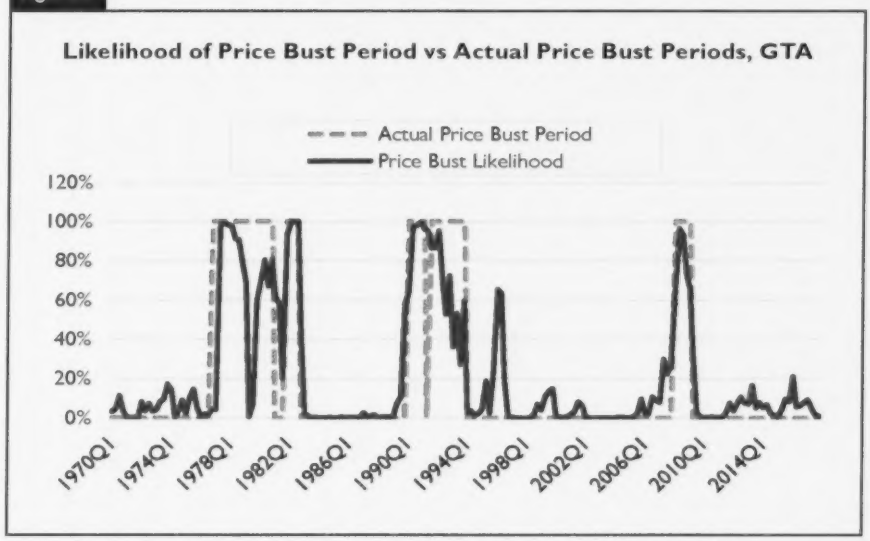
Table 1
Home Price Bust Periods in GTA

Price Bust	Peak	Trough	Duration (# of quarters)	Magnitude
1	1976Q3	1980Q4	17	-17%
2	1981Q3	1982Q3	4	-15%
3	1989Q4	1991Q1	5	-34%
4	1991Q2	1993Q4	10	-17%
5	2007Q4	2009Q1	5	-11%
	AVERAGE		8	**-19%**

Source: TREB, Bank of Canada, CMHC calculations

persisted for eight quarters with inflation adjusted prices decreasing by almost 20%. The model was constructed to predict bust periods persisting a minimum of four quarters and where inflation adjusted prices declined by at least 10% cumulatively as these episodes would have a more meaningful impact on economic and financial stability. Factors[23] that had the most explanatory power in predicting these bust periods included: rising overvaluation, declining spread between long and short term interest rates, weakening consumer sentiment and the introduction of more restrictive government housing policy. Factors that had more negligible impact in predicting major bust periods included: rising credit to GDP ratios, rising speculation, a growing housing stock and declining foreign capital flows. As per figure 3, the model was successful about 66% of the time in predicting historical bust periods with probabilities increasing prior to most bust periods to follow.

Figure 3



Source: Bank of Canada, Statistics Canada, Conference Board, TREB, Ministry of Finance, Department of Finance, CMHC

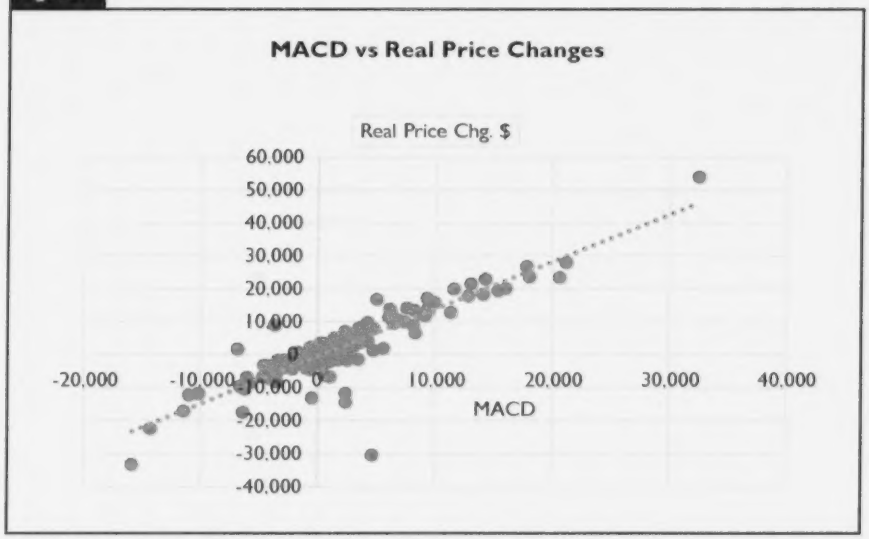
Our findings also suggest that inflation adjusted home prices are most sensitive[24] and vulnerable to changes in government housing policy[25] at a provincial and federal level and the level of overvaluation. However, while these are necessary they are not sufficient conditions on their own. History has shown that macro prudential policy effects fade over longer periods of time while market overvaluation could persist for some time before impacting prices in a meaningful way. Price bust episodes in the past that persisted were most often preceded by financial shocks that eventually impacted the economy[26] (i.e. collapsing yield spreads) suggesting a combination of deteriorating conditions are needed. The 2017 Toronto housing market experience can be used to test this hypothesis in real time. While overvaluation and more restrictive government housing policy became more pronounced early last year, these factors were not sufficient to trigger a bust period due to the absence of a fundamental shock. Indeed, the probability model flagged a moderate rather than a high likelihood of a price bust period in early 2017 and experience confirmed this with Toronto inflation adjusted prices stabilizing as early as the fourth quarter[27].

Likelihood of a Bust Period Ahead Drops to Low from Moderate

The likelihood of an imminent price bust period is currently low, as opposed to being moderate in early 2017. This can be explained by an improvement in economic and demographic conditions. Firstly, the level of overvaluation has been easing in the Toronto market as a result of a dip in market prices coinciding with an improving economic and demographic backdrop through 2017. While we expect economic growth in Ontario to slow in 2018 and 2019[28], employment and incomes will continue to grow supporting Ontario housing prices. Furthermore, wages have begun to respond to tight labour markets with growth in Ontario average weekly earnings more than doubling between the third and fourth quarter of 2017. Indeed, the spread between long and short term interest rates which measures the speed at which monetary policy is tightening and the resulting impact on growth expectations, points to continued economic growth and less risk to home prices. In addition, new households[29] created has outpaced the increase in the housing stock - adding further support to the level of home prices as new supply is not keeping pace with new demand.

Ontario consumer sentiment[30] and expectations further lend support to home prices. Ontario consumer confidence hit a post-recession high by the fourth quarter of 2017. This is likely re-shaping housing consumer home price expectations. In fact, print and social media searches[31] on housing bubbles/corrections have lessened dramatically suggesting the level of concern regarding home prices has eased by the latter part of 2017. Indeed, a recent home buyer and motivation survey[32] supported this conclusion with only a small share of Toronto survey respondents expecting negative price growth in 2018. In fact, most Toronto households believe that prices will rise in line with historical experience.

Figure 4



Source: TREB, Statistics Canada, Stockcharts.com, CMHC calculation

Technical Indicators Suggests Home Prices Will Remain Stable

Technical Analysis is the forecasting of future price movements based exclusively on an examination of past price movements[33]. It originated from the *Dow Theory* which based its assessment on the behavior of stock prices. The *Dow Theory* laid the foundations for what was later to become modern technical analysis. Of the many theorems put forth by Charles Dow, three stand out:

- All Relevant Information is Included in Current Prices
- Price Movements Are Not Totally Random
- "What" Is More Important than "Why"

Technical analysis can be a good complement to the fundamental approach we employed earlier. We have chosen to use autoregressive models (ARs) and momentum indicators to get a better understanding of where home prices are likely headed in the short term given historical price patterns. With the share of investment activity increasing in recent years in the Ontario market place, technical indicators should carry more prominence as they are indicators tracked by investors. But historical price patterns also help guide end user expectations and behavior. As indicated earlier, a recent CMHC homebuyer motivation survey found recent Toronto buyers based their forward looking price expectations on recent history which acknowledges the value in examining historical price behavior in more detail. The results from our latest forecasts using autoregressive models suggest inflation adjusted Toronto prices would be flat in 2018 followed by a small uptick in 2019.

Momentum indicators can also predict where home prices are likely headed. Examples used in this analysis include moving average crossovers (MACD line) and the Coppock[34] curve. The MACD[35] provides information on the momentum of home prices and the price trend direction in the immediate term. A growing MACD points to increasing price momentum and trend while a declining MACD points to the reverse. The clustering of data in figure 4 suggests that the modestly negative fourth quarter 2017 reading on the MACD for Toronto real home prices points to a stable profile for inflation adjusted home prices ahead based on historical trends. Similarly, given that the MACD indicator is driven by forces of supply and demand, it is expected that a moderate rise in the sales to new listings ratio through 2018 should be a positive boost to the MACD and by extension to nominal home prices.

Conclusion

Fundamental and technical approaches utilized in this study suggest that inflation adjusted home prices in the province of Ontario should remain relatively stable and close to fourth quarter 2017 levels. Put another way, nominal home prices should grow in line with the general rate of inflation over the 2018/19 period. This is good news for prospective buyers as fewer bidding

wars will result in less urgency to act. For homeowners and investors it means home price expectations will need to normalize.

The current home price correction in Ontario will likely not persist as it fails to resemble the more serious downturns observed across time. While imbalances continue to persist, they are easing and fundamentals such as income growth, growth in new households and the level of interest rates will support home prices relative to historical price bust period experiences. It is also important not to paint the entire Ontario market with one brush. More affordable segments of the market will outperform as will more affordable urban centers in eastern and southern Ontario as GTA prices resume growth. However, downside risks[36], considered lower probability events, are still present and could impact the market. An Ontario/GTA economy growing below forecast, steeper interest rate increases or declining consumer and business sentiment may result in growing imbalances and further downward pressure on prices.

Limitations of Current Approaches

While the sample size is sufficient, the study relied exclusively on a time series approach. To obtain a more robust set of results would require investigating the use of panel data. This method would be more closely aligned with the Bauer (2014) approach referenced earlier whereby experiences of different Canadian cities could be examined which could capture more price cycles. This approach could be examined as future research if data permits.

Caution should also be exercised in using technical indicators. These indicators work best in highly liquid markets with high frequency data. High frequency transactional housing data could be examined in the future to complement the current approach.

ENDNOTES

[1] Bust periods here defined as more serious corrections/contractions that persist at least four quarters with a minimum cumulative 10% drop in inflation adjusted prices. We use Bauer (2014) *International House Price Cycles, Monetary Policy and Risk Premiums, Bank of Canada Working Paper as a guide.*

[2] Acknowledgements for team contributors: Murtaza Said, Edward Heese, Abdul Kargbo, James Cuddy.

[3] Indicators: economic cycle, growth in incomes, population, interest rates and balance between demand and supply.

[4] *Technical indicators* are tools used to help forecast future price movements based exclusively on an examination of past price movements. See Technical Appendix.

[5] CMHC Housing Market Assessment, 2018Q1.

[6] Statistics Canada Survey of Financial Security, 2016.

[7] Equifax Ontario data, 2017Q4.

[8] What triggered the price decline is the first round effect and could vary by country and region.

[9] A wealth effect is caused by changes in aggregate demand resulting from changes in the value of assets such as stocks, bonds or real assets. A negative wealth effect or decrease in the market value of these assets induces a feeling of being 'poorer' among owners (even if no additional cash is realized) and often tends to discourage spending and to increase savings.

[10] IMF - *Movements in Asset Prices Since the Mid 1980s*, Juha Kahkonen, 2001.

[11] Housing prices and the business cycle. An empirical application to Hong Kong – Michael Funke, Michael Paetz.

[12] CREA, Equifax, CMHC calculations.

[13] See *Methodology & Definition* Section on approaches used.

[14] Amplitude defined as the distance from peak to trough.

[15] Particularly true post 1990 using turning point analysis and the Hodrick-Prescott Filter.

[16] CMHC, Booms and Busts in Housing Markets - Agnello, Schuknecht (2011).

[17] Statistics Canada, Ontario Ministry of Finance.

[18] Detailed findings in CMHC report - *Examining Escalating House Prices in Large Canadian Metropolitan Centres, Feb. 2018.*

[19] CREA MLS HPI Index, April 2018.

[20] See Logit Model in *Methodology and Definitions Section.*

[21] See Logit model in *Methodology & Definition* section for more details.

[22] GTA House Price Spillovers to Surrounding Centres, CMHC HMI Report, Jan 2017.

[23] Some of these factors also at play triggering price bust periods in international markets as per literature review.

[24] See Marginal Effects in *Methodology* Section.

[25] Especially true for housing specific tax policy changes (CGIR) – See Methodology and Definition Section.

[26] Classification of recession severity, CD Howe Institute Business Cycle Council.

[27] Price bust condition not met.

[28] CMHC Housing Market Outlook, Regional Highlights – fall 2017.

[29] CMHC Ontario demographic estimates, Feb. 2018.

[30] Conference Board Ontario consumer confidence index.

[31] CMHC social and print media data engine searches by Toronto consumers.

[32] CMHC Home Buyer and Motivation Survey(HBMS), Fall 2017.

[33] Stockcharts.com.

[34] See Coppock Curve in *Methodology Section.*

[35] Stockcharts.com, See MACD in *Methodology & Definition* section for more details.

[36] CMHC Housing Market Outlook, Ontario Regional Highlights, Fall 2017.

TECHNICAL APPENDIX METHODOLOGY & DEFINITIONS

Approaches Used to Detect Home Price Vulnerabilities

Fundamental analysis utilizes two family of models which include structural and probability models. Structural models try to explain movements in prices that are caused by fundamental indicators with a focus on cyclical, economic and demographic factors. Another complementary fundamental approach includes the utilization of probability models that provide the likelihood of entering a price bust period based on historical relationships between prices and potential triggers. Finally, technical analysis is a second approach used to detect changing momentum in home prices to address potential impacts on investor behaviour. Both auto regressive and moving average models along with other momentum indicators were utilized here to detect potential turning points.

Logit Model

In statistics, a logistic regression is a regression model where the dependent variable (Y) is categorical or not continuous. Logistic regression can be binomial, ordinal or multinomial. Binomial or binary logistic regression deals with situations in which the observed outcome for a dependent variable can have only two possible types, "0" and "1". The binary logistic model is used to estimate the probability of a binary response based on one or more predictor (or independent) variables. It allows one to say that the presence of a risk factor increases the odds of a given outcome by a specific factor. If a particular observed outcome for the dependent variable is the noteworthy possible outcome (referred to as a "success" or a "case") it is usually coded as "1" and the contrary outcome (referred to as a "failure" or a "noncash") as "0". In our case, the dependent variable (Y, probability of price bust period) takes the value of "1" during the first quarter of a minimum four quarter correction in inflation adjusted prices (see bust periods, Figure 3), and zero otherwise. The logistic regression model is simply a non-linear transformation of the linear regression.

$$\ln[p/(1-p)] = \mathbf{a} + \mathbf{B}X + e$$
or
$$[p/(1-p)] = \exp(\mathbf{a} + \mathbf{B}X + e)$$

where:

- ln is the natural logarithm, logexp, where exp=2.71828...
- p is the probability that the event Y occurs, p(Y=1)
- p/(1-p) is the "odds ratio"
- ln[p/(1-p)] is the log odds ratio, or "logit"

Logit Theoretical Framework

Dependent Dummy (Y): This is the dependent variable. A value of 1 is given in the first quarter that belonged to one of the five price bust periods, 0 otherwise. Price bust periods were determined using the Bauer (2014) approach of a minimum 4 quarter, minimum 10% cumulative real price decline.

Overvaluation: Estimates percent deviation of actual average inflation adjusted Toronto home price from the expected average fundamental price based on population, income and the mortgage rates. If homes are priced higher than the value consistent with housing market fundamentals, prices are expected to decrease at some point as many people, such as those in the fundamentally important first time home buyers category, are unable to purchase homes, decreasing future demand.

Yield Spread (YS): Yield spread of 10 year and the 3 month Treasury bill (T-Bill). This variable captures expectations on the state of the economy and inflation in the future. It also indicates how restrictive or accommodative monetary policy is in the short run. A higher yield spread indicates a stronger economy in the near term, which would be positive for fundamentals such as household employment and income. As such, an increase in the spread should decrease the

likelihood of a price bust period in the near future while a decrease in the spread could result in the reverse effect.

CCI: Consumer Confidence Index for Ontario from the Conference Board of Canada. This variable is based on a survey of households' opinions about their current a[illegible] future financial situation and spending plans. A higher index implies economic growth due to increased consumer spending particularly on major purchases like housing.

CGIR: A dummy variable for the imposition of the federal tax on capital gains (0 before imposition, 1 after imposition). increase in the capital gains tax (by increasing the capital gains inclusion rate) is expected to dampen home prices. This is due to a decline in investor demand, since the tax should, all other things remaining equal, reduce the return on investment.

LTT: A dummy variable for the imposition of the provincial Land Transfer Tax (LTT). Actual LTT data obtained from the provincial Ministry of Finance. Same approach to variable values as CGIR. The LTT increases the cost of purchases by both owner-occupiers and investors and thus could dampen housing demand and prices.

LTV & GDS: An increase in loan to value (LTV) or gross debt service ratios (GDS) is expected to strengthen house prices. This is due to an increase in demand as a result of greater borrower capacity granted with less restrictive lending requirements. Factors exerting downward pressure on LTV and GDS ratios, dampen likelihood of a price bust.

Supply independent variables: Estimated housing stock, completions and new housing price index were tested as potential triggers each having a negligible impact on explaining price bust periods historically.

Table 2
Estimated Logit Equation Historical Performance
(1967Q2 - 2017Q2)

	Y=0 (no bust)	Y=1 (bust)	Total
Total Cases (quarters)	160	41	201
Total Correct	158	27	185
% Correct	99	66	92
% Incorrect	1	34	8

Source: Bank of Canada, Statistics Canada, Conference Board, TREB, Ministry of Finance, Department of Finance, CMHC

Logit Marginal Effects

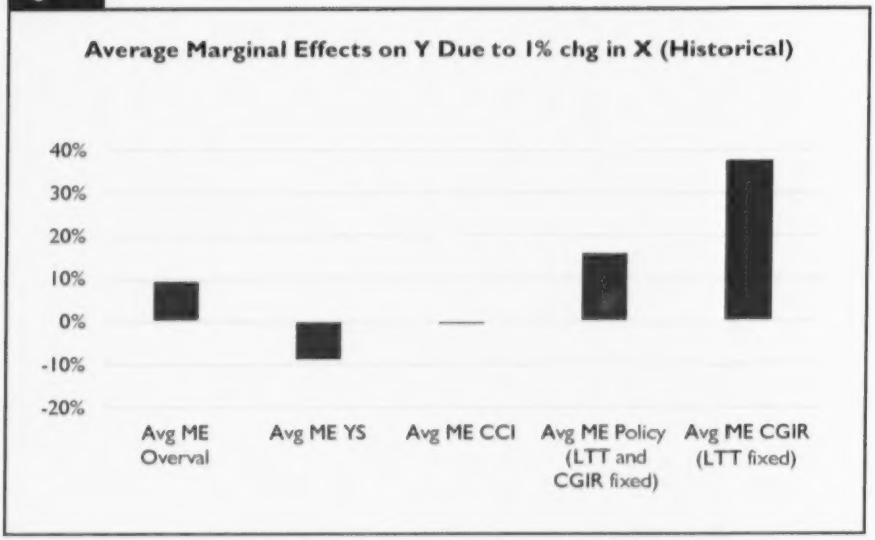
The estimated coefficients must be interpreted with care. Instead of the slope coefficients (**B**) being the rate of change in Y (the dependent variable) as X changes (as in the LP model or OLS regression), now the slope coefficient is interpreted as the rate of change in the "log odds" as X changes. This explanation is not very intuitive. It is possible to compute the more intuitive "marginal effect" of a continuous independent variable on the probability. The marginal effect is

$dp/d\mathbf{B} = f(\mathbf{B}X)\mathbf{B}$

where f(.) is the density function of the cumulative probability distribution function [F(**B**X), which ranges from 0 to 1], **B** is the coefficient(s) on the independent variable(s) X,

The marginal effects (ME) depend on the values of the independent variables. An average marginal effect is a percentage effect on the Y binary variable for every unit % change in your X independent variables (i.e. triggers) over the sample period.

Figure 5



Source: Bank of Canada, Statistics Canada, Conference Board, TREB, Ministry of Finance, Department of Finance, CMHC

TECHNICAL INDICATORS

Moving Average Convergence-Divergence (MACD)

In technical analysis the MACD line is an indicator that measures the relationship between two moving averages. It was first implemented by Gerald Appel in 1970s. MACD can be used to identify aspects of a security's overall trend. Most notably these aspects include momentum, as well as trend direction and duration. Moving average cross overs help detect changing momentum and trend direction in commodity, currency, equity, bond and real asset prices. In this study, we utilize a two and seven period weighted moving average approach on inflation adjusted home prices. A two period weighted moving average crossing below the seven period moving average from above has historically indicated a decline in the momentum and direction of the price trend. Alternatively, a two period weighted moving average crossing above the seven period moving average from below points to an increase in the momentum and direction of the price trend.

Coppock Curve

Similar to the MACD indicator, the Coppock curve is a smoothed momentum indicator that examines monthly data to uncover buy and sell signals over the medium to longer term. Similar to the MACD, a cross over from positive to negative territory is indicative that a long term sell signal is gaining strength as supply pressures in the housing market are outweighing demand pressures. The latest monthly data suggests a break below zero is approaching. However, the current reading on the Coppock curve is still well above previous readings during the most serious price bust periods in the early 1980s and 1990s.

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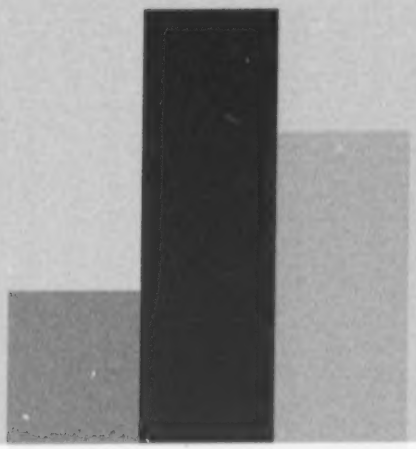

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